

WHAT IS CLAIMED IS:

1. A retainer assembly for a punch press, the retainer assembly comprising a holder plate of a desired thickness, the holder plate having therein formed first and second elongated openings each extending entirely through the thickness of the holder plate, said first and second openings being adjacent and generally parallel to each other, said first opening being configured to receive the shank of a tool, the retainer assembly including a removable ball-lock insert assembly comprising an insert body, the insert body having an axis and an elongated interior recess extending at an angle relative to said axis, the elongated interior recess being configured to house a resiliently-biased engagement member, the insert body being configured to be received axially within said second opening in an operative position wherein one end region of the elongated interior recess opens through a sidewall of the insert body into said first opening in the holder plate.
2. The retainer assembly of claim 1 wherein the insert body has a height that is substantially equal to the thickness of the holder plate.
3. The retainer assembly of claim 1 wherein the holder plate has generally-opposed front and rear faces, the insert body having a front face that is substantially flush with the front face of the holder plate when the insert body is in its operative position.
4. The retainer assembly of claim 1 wherein a removal tool can be inserted into an elongated access opening that extends through the insert body and into the elongated interior recess of the insert body.

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5. The retainer assembly of claim 4 wherein the front-most length of the elongated access opening is bounded by the insert body.
6. The retainer assembly of claim 5 wherein substantially the entire length of the elongated access opening is bounded on all sides by the insert body.
- 5 7. The retainer assembly of claim 1 wherein the insert body has a cylindrical outer configuration having a circular cross section.
8. The retainer assembly of claim 7 wherein said second opening in the holder plate has a cylindrical interior configuration.
9. The retainer assembly of claim 8 wherein the insert body has an exterior diameter that is slightly less than an interior diameter of said second bore in the holder plate, such that the insert body is fitted snugly within said second bore when placed in said operative position.
10. The retainer assembly of claim 1 wherein said first and second openings in the holder plate intersect each other.
- 15 11. The retainer assembly of claim 10 wherein the engagement member has a width greater than a width of intersection of said first and second bores in the holder plate.
12. The retainer assembly of claim 11 wherein said engagement member when housed in said elongated interior recess is resiliently biased toward a locking position wherein a portion of the engagement member partially obstructs said first bore in the holder plate when the insert body is placed in said operative position.
- 20 13. The retainer assembly of claim 12 wherein the engagement member is a ball.

14. The retainer assembly of claim 13 wherein the engagement member is resiliently biased toward said locking position by a spring in said elongated interior recess.

15. A retainer assembly for a punch press, the retainer assembly comprising a holder plate having a first workpiece-facing surface and second rear surface, said first and second surfaces being generally opposed, the holder plate having therein formed first and second elongated openings, each opening through the workpiece-facing surface of the holder plate, said first and second openings being adjacent and generally parallel to each other, said first opening being configured to receive the shank of a tool, the retainer assembly including a ball-lock insert assembly comprising an insert body having a height that is substantially equal to the thickness of the holder plate, the insert body having an axis and an elongated interior recess extending at an angle relative to said axis, the elongated interior recess housing a resiliently-biased engagement member, the insert body being removably mounted within said second opening in an operative position wherein one end region of the elongated interior recess opens through a sidewall of the insert body into said first opening in the holder plate.

16. The retainer assembly of claim 15 wherein the insert body has a front face that is substantially flush with the front face of the holder plate.

17. The retainer assembly of claim 15 wherein an elongated access opening extends between a front face of the insert body and substantially the entire length of the elongated access opening is bounded on all sides by the insert body.

18. A ball-lock insert assembly adapted to be removably mounted axially in a mount opening formed in a holder plate of a desired thickness, the ball-lock insert

assembly comprising an insert body having an axis and an elongated interior recess extending at an angle relative to said axis, the elongated interior recess housing a resiliently-biased engagement member, the insert body having at least one catch surface configured for securing the insert body within the mount opening in the holder plate.

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19. The ball-lock insert assembly of claim 18 wherein the insert body has a cylindrical exterior configuration.
20. The ball-lock insert assembly of claim 18 wherein the resiliently-biased engagement member housed in said elongated interior recess is a ball.
- 10 21. The ball-lock insert assembly of claim 18 wherein a removal tool can be inserted into an elongated access opening that extends through the insert body and into the elongated interior recess.
22. The ball-lock insert assembly of claim 21 wherein the front-most length of the elongated access opening is bounded by the insert body.
- 15 23. The ball-lock insert assembly of claim 22 wherein substantially the entire length of the elongated access opening is bounded on all sides by the insert body.
24. The ball-lock insert assembly of claim 18 wherein the insert body has a height that is substantially equal to the thickness of the holder plate.
- 20 25. The ball-lock insert assembly of claim 18 wherein the insert body has a catch surface defined by a shoulder integral to the insert body.
26. The ball-lock insert assembly of claim 25 wherein said shoulder is defined by an oversized base of the insert body.

27. The ball-lock insert assembly of claim 25 wherein the insert body has a reduced-diameter front end portion and said shoulder is defined by a full-diameter base portion of the insert body.

28. The ball-lock insert assembly of claim 18 wherein the insert body has a catch surface provided by a circumferentially-extending slot that is formed in the insert body and is adapted to receive a retaining ring.

29. A method of producing a retainer assembly, the method comprising:

a) providing a ball-lock insert assembly comprising an insert body having an axis and an elongated interior recess extending at an angle relative to said axis, the elongated interior recess being configured to house a resiliently-biased engagement member;

b) providing a holder plate having a front, workpiece-facing surface and a rear surface, said front and rear surfaces being generally opposed; and

c) forming in the holder plate an elongated mount opening that opens through the front, workpiece-facing surface of the holder plate, the elongated mount opening being configured to axially receive the insert body.

30. The method of claim 29 wherein the mount opening is formed so as to extend entirely between the front and rear surfaces of the holder plate.

31. The method of claim 29 wherein the mount opening is formed in the holder plate by drilling.

32. The method of claim 29 further comprising forming in the holder plate a shank-receiving opening adapted to receive the shank of a tool, the shank-receiving opening being adjacent and generally parallel to the mount opening.

33. The method of claim 32 wherein the shank-receiving opening and the mount opening are formed in the holder plate so as to intersect each other.

34. The method of claim 33 further comprising removably mounting the insert body within the elongated mount opening in the holder plate.

35. The method of claim 34 further comprising attaching the rear face of the holder plate to a backing plate.

36. The method of claim 29 further comprising forming in the holder plate a second elongated mount opening that opens through the front, workpiece-facing surface of the holder plate, the second mount opening being configured to receive a second ball-lock insert assembly of the nature described in step a) of claim 29.